

What is claimed is:

1 1. An inverter for driving multiple discharge lamps
2 comprising:
3 a transformer for driving a first discharge lamp and a
4 second discharge lamp, comprising primary and
5 secondary windings;
6 a first balancing circuit connected in series with the
7 first discharge lamp, sensing a first lamp current
8 through the first discharge lamp to provide a first
9 sensing signal, for adjusting the first lamp current
10 in accordance with a matching signal;
11 a second balancing circuit connected in series with the
12 second discharge lamp, sensing a second lamp current
13 through the second discharge lamp to provide a second
14 sensing signal, for adjusting the second lamp current
15 in accordance with the matching signal; and
16 a comparator receiving the first and the second sensing
17 signals, for comparing the first sensing signal with
18 the second sensing signal to generate the matching
19 signal used to control the first and the second
20 balancing circuits, thereby equalizing the first lamp
21 current and the second lamp current.

1 2. The inverter as recited in claim 1 wherein the
2 comparator drives the matching signal to a first state
3 when the first sensing signal is greater than the second
4 sensing signal and drives the matching signal to a second
5 state when the first sensing signal is less than the
6 second sensing signal.

1 3. The inverter as recited in claim 2 wherein the first
2 balancing circuit comprises a first transistor circuit,
3 in response to the matching signal, for decreasing the
4 first lamp current when the matching signal is in the
5 first state, and for increasing the first lamp current
6 when the matching signal is in the second state.

1 4. The inverter as recited in claim 2 wherein the
2 second balancing circuit comprises a second transistor
3 circuit, in response to the matching signal, for
4 increasing the second lamp current when the matching
5 signal is in the first state, and for decreasing the
6 second lamp current when the matching signal is in the
7 second state.

1 5. The inverter as recited in claim 3 wherein the first
2 balancing circuit further comprises a first coupling
3 device connected between the comparator and the first
4 transistor circuit, for protecting against noise from the
5 comparator.

1 6. The inverter as recited in claim 4 wherein the
2 second balancing circuit further comprises a second
3 coupling device connected between the comparator and the
4 second transistor circuit, for protecting against noise
5 from the comparator.

1 7. The inverter as recited in claim 3 wherein the
2 first balancing circuit further comprises a first
3 rectifier circuit having an input port and an output
4 port, where one terminal of the input port is coupled to

5 the first discharge lamp and terminals of the output port
6 are coupled across the first transistor circuit.

1 8. The inverter as recited in claim 4 wherein the
2 second balancing circuit further comprises a second
3 rectifier circuit having an input port and an output
4 port, where one terminal of the input port is coupled to
5 the second discharge lamp and terminals of the output
6 port are coupled across the second transistor circuit.

1 9. The inverter as recited in claim 7 wherein the first
2 balancing circuit further comprises a first sensing
3 circuit for sensing the first lamp current through the
4 first discharge lamp to provide the first sensing signal,
5 in which the first sensing circuit has its input terminal
6 coupled to the other terminal of the first rectifier
7 circuit's input port and has its output terminal coupled
8 to a first input terminal of the comparator.

1 10. The inverter as recited in claim 8 wherein the
2 second balancing circuit further comprises a second
3 sensing circuit for sensing the second lamp current
4 through the second discharge lamp to provide the second
5 sensing signal, in which the second sensing circuit has
6 its input terminal coupled to the other terminal of the
7 second rectifier circuit's input port and has its output
8 terminal coupled to a second input terminal of the
9 comparator.

1 11. The inverter as recited in claim 1 further
2 comprising:

3 a resonant push-pull converter, including the
4 transformer generating an AC voltage in a push-pull
5 manner at the secondary winding to drive the first
6 and the second discharge lamps in parallel; and
7 drive circuitry for controlling the resonant push-pull
8 converter to regulate the AC voltage in accordance
9 with the first sensing signal, in which the input of
10 the drive circuitry receives a DC voltage and the
11 output of the drive circuitry is coupled to the
12 transformer's primary winding.

1 12. An inverter for driving multiple discharge lamps
2 comprising:

3 a resonant push-pull converter, including a transformer
4 having a primary winding and a secondary winding that
5 is coupled to a parallel connection of a first and
6 second discharge lamp, for generating an AC voltage
7 in a push-pull manner at the secondary winding to
8 drive the first and the second discharge lamps in
9 parallel;
10 a first balancing circuit connected in series with the
11 first discharge lamp, sensing a first lamp current
12 through the first discharge lamp to provide a first
13 sensing signal, for adjusting the first lamp current
14 in accordance with a matching signal;
15 a second balancing circuit connected in series with the
16 second discharge lamp, sensing a second lamp current
17 through the second discharge lamp to provide a second
18 sensing signal, for adjusting the second lamp current
19 in accordance with the matching signal;

20 a comparator receiving the first and the second sensing
21 signals, for comparing the first sensing signal with
22 the second sensing signal to generate the matching
23 signal used to control the first and the second
24 balancing circuits, thereby equalizing the first lamp
25 current and the second lamp current; and
26 drive circuitry for controlling the resonant push-pull
27 converter to regulate the AC voltage in accordance
28 with the first sensing signal, in which the input of
29 the drive circuitry receives a DC voltage and the
30 output of the drive circuitry is coupled to the
31 transformer's primary winding.

1 13. The inverter as recited in claim 12 wherein the
2 comparator drives the matching signal to a first state
3 when the first sensing signal is greater than the second
4 sensing signal and drives the matching signal to a second
5 state when the first sensing signal is less than the
6 second sensing signal.

1 14. The inverter as recited in claim 13 wherein the
2 first balancing circuit comprises a first transistor
3 circuit and the second balancing circuit comprises a
4 second transistor circuit, wherein the first transistor
5 circuit decreases the first lamp current and the second
6 transistor circuit increases the second lamp current
7 respectively in response to the matching signal in the
8 first state, and wherein the first transistor circuit
9 increases the first second lamp current and the second
10 transistor circuit decreases the second lamp current

11 respectively in response to the matching signal in the
12 second state.

1 15. The inverter as recited in claim 14 wherein the
2 first balancing circuit further comprises a first
3 coupling device and the second balancing circuit further
4 comprises a second coupling device, for respectively
5 protecting against noise from the comparator, wherein the
6 first coupling device is connected between the comparator
7 and the first transistor circuit, and wherein the second
8 coupling device is connected between the comparator and
9 the second transistor circuit.

1 16. The inverter as recited in claim 14 wherein the
2 first balancing circuit further comprises a first
3 rectifier circuit and the second balancing circuit
4 further comprises a second rectifier circuit, wherein one
5 terminal of the first rectifier circuit's input port is
6 coupled to the first discharge lamp and terminals of the
7 first rectifier circuit's output port are coupled across
8 the first transistor circuit, and wherein one terminal of
9 the second rectifier circuit's input port is coupled to
10 the second discharge lamp and terminals of the second
11 rectifier circuit's output port are coupled across the
12 second transistor circuit.

1 17. The inverter as recited in claim 16 wherein the
2 first balancing circuit further comprises a first sensing
3 circuit for sensing the first lamp current through the
4 first discharge lamp to provide the first sensing signal,
5 in which the first sensing circuit has its input terminal

6 coupled to the other terminal of the first rectifier
7 circuit's input port and has its output terminal coupled
8 to a first input terminal of the comparator.

1 18. The inverter as recited in claim 16 wherein the
2 second balancing circuit further comprises a second
3 sensing circuit for sensing the second lamp current
4 through the second discharge lamp to provide the second
5 sensing signal, in which the second sensing circuit has
6 its input terminal coupled to the other terminal of the
7 second rectifier circuit's input port and its output
8 terminal coupled to a second input terminal of the
9 comparator.

1 19. An inverter for driving multiple discharge lamps
2 comprising:
3 a transformer for driving a plurality of discharge
4 lamps, comprising primary and secondary windings;
5 a plurality of balancing circuits respectively
6 connected in series with the corresponding discharge
7 lamps, sensing respective lamp currents through their
8 corresponding discharge lamps to provide a plurality
9 of sensing signals, for adjusting the lamp currents
10 in accordance with a set of matching signals; and
11 a comparator for comparing the sensing signals from the
12 balancing circuits to generate the set of matching
13 signals used to control the balancing circuits,
14 thereby equalizing the lamp currents among the
15 discharge lamps.

1 20. The inverter as recited in claim 19 wherein each of
2 the balancing circuits comprises a transistor circuit in
3 response to the corresponding matching signal set, when
4 one of the matching signals indicates that its
5 corresponding lamp current is the largest of all, the
6 corresponding transistor circuit decreases the largest
7 lamp current and the rest of the transistor circuits
8 increase the other lamp currents.

1 21. The inverter as recited in claim 20 wherein each of
2 the balancing circuits further comprises a coupling
3 device connected between the comparator and its
4 associated transistor circuit, for protecting against
5 noise from the comparator.

1 22. The inverter as recited in claim 21 wherein each of
2 the balancing circuits further comprises a rectifier
3 circuit having an input port and an output port, where
4 one terminal of each rectifier circuit's input port is
5 coupled to the corresponding discharge lamp and terminals
6 of each rectifier circuit's output port are coupled
7 across its associated transistor circuit.

1 23. The inverter as recited in claim 22 wherein each of
2 the balancing circuits further comprises a sensing
3 circuit for sensing the corresponding lamp current to
4 provide the respective sensing signal, in which each
5 sensing circuit has its input terminal coupled to the
6 other terminal of its associated rectifier circuit's
7 input port and has its output terminal coupled to a
8 corresponding terminal of the comparator.

1 24. The inverter as recited in claim 19 further
2 comprising:
3 a resonant push-pull converter, including the
4 transformer generating an AC voltage in a push-pull
5 manner at the secondary winding to drive the
6 discharge lamps in parallel; and
7 drive circuitry for controlling the resonant push-pull
8 converter to regulate the AC voltage in accordance
9 with the one of the sensing signals, in which the
10 input of the drive circuitry receives a DC voltage
11 and the output of the drive circuitry is coupled to
12 the transformer's primary winding